CLAIMS

1. A transparent substrate, especially glass substrate, comprising an antireflection coating on at least one of its faces, which is made of a thin-film multilayer (A) of dielectric material with alternately high and low refractive indexes, characterized in that at least one of the layers of high refractive index comprises a mixed silicon zirconium nitride, the refractive index of at least one of the high-index layers being between 2.10 and 2.30, preferably between 2.15 and 2.25.

2. The substrate as claimed in claim 1, characterized in that the atomic percentage of zirconium within the high-index layer is such that Si/Zr is between 4.6 and 5.

3. The substrate as claimed in either of the preceding claims, characterized in that the layer of high refractive index is doped using a metal, especially aluminum.

4. The substrate as claimed in one of claims 1 to 3, characterized in that it comprises, in succession:

- a high-index first layer (1) having a refractive index n_1 of between 2.1 and 2.3 and a geometrical thickness e_1 of between 5 and 50 nm;
- a low-index second layer (2) having a refractive index n_2 of between 1.35 and 1.65 and a geometrical thickness e_2 of between 5 and 50 nm;
- a high-index third layer (3) having a refractive index n_3 of between 2.1 and 2.3 and a geometrical thickness e_3 of between 40 and 120 nm; and
- a low-index fourth layer (4) having a refractive index n_4 of between 1.35 and 1.65 and a geometrical thickness e_4 of between 40 and 120 nm.

5. The substrate as claimed in claim 4, characterized

in that the low-index second layer (2) and/or the low-index fourth layer (4) are based on silicon oxide, silicon oxynitride and/or silicon oxycarbide or on a mixed silicon aluminum oxide.

6. The substrate as claimed in one of claims 1 to 4, characterized in that the high-index first layer (1) and/or the high-index third layer (3) consist of a superposition of several high-index layers, at least one of the layers comprising a mixed silicon zirconium nitride.

7. The substrate as claimed in one of the preceding claims, characterized in that its light reflection on the side where it is provided with the thin-film multilayer is lowered by a minimum amount of 3 or 4% at normal incidence.

8. The substrate as claimed in one of the preceding claims, characterized in that the colorimetric response of its light reflection on the side where it is provided with the thin-film multilayer is such that the corresponding value of b* in the (L*,a*,b*) colorimetry system is negative and less than 15 in absolute value, for a 0° angle of incidence.

9. The substrate as claimed in one of claims 1 to 7, characterized in that the colorimetric response of its light reflection on the side where it is provided with the thin-film multilayer is such that the variation in the parameters expressed in the (L*,a*,b*) colorimetry system with angle of incidence varying between 0° and 70° is limited in absolute value to 10.

10. The substrate as claimed in one of claims 1 to 9, characterized in that the multilayer uses at least one high-index layer based on a mixed silicon zirconium nitride so that it has a very high mechanical durability, such that ΔH in the Taber test is less than

4% after 650 revolutions.

11. Multiple glazing, especially double glazing, or glazing with a laminated structure, comprising at least two substrates as claimed in any one of claims 1 to 10, characterized in that the two glass substrates (6) are joined together by means of a sheet (7) of thermoplastic material or by means of an intermediate seal in the case of a double glazing unit, said substrate (6) being provided on the opposite side from the join:

- either with an antireflection multilayer;
- or with a coating having another functionality, of the solar-protection, low-emissivity, antisoiling, antifogging, antirain, heating or electromagnetic shielding type, it being possible for said coating having another functionality to be on one of the faces of the substrates turned toward the thermoplastic joining sheet,

said substrate being provided on the joining side with a coating having electromagnetic wave shielding properties.

12. A transparent substrate, especially glass substrate, provided with a thin-film multilayer comprising an alternation of n functional layers having reflection properties in the infrared and/or in solar radiation and n+1 coatings composed of one or more layers of dielectric material, in such a way that each functional layer is placed between two coatings, characterized in that at least one of the layers of dielectric material is based on a mixed silicon zirconium nitride, the Si/Zr atomic percentage ratio being between 4.6 and 5 and its refractive index being between 2.0 and 2.3 and preferably between 2.15 and 2.25.

13. The substrate as claimed in claim 12, characterized in that the multilayer comprises a single

functional layer placed between two coatings.

14. The substrate as claimed in claim 12, characterized in that the multilayer comprises two functional layers alternating with three coatings.

15. The substrate as claimed in claim 12, characterized in that the multilayer comprises three functional layers alternating with four coatings.

16. The substrate as claimed in one of claims 12 to 15, characterized in that the functional layer is based on silver, based on a silver mixture or based on gold or palladium.

17. The substrate as claimed in claims 12 and 13, characterized in that it comprises:

- a first high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 10 and 40 nm;
- a first functional layer; and
- a second high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 15 and 40 nm.

18. The substrate as claimed in claims 12 and 14, characterized in that it comprises:

- a first high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 10 and 40 nm;
- a first functional layer;
- a second high-index dielectric material having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 5 and 70 nm;
- a second functional layer; and
- a third high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 10 and 40 nm.

19. The substrate as claimed in claims 12 and 15, characterized in that it comprises:

- a first high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 10 and 40 nm;
- a first functional layer;
- a second high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 5 and 70 nm;
- a second functional layer;
- a third high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 5 and 70 nm;
- a third functional layer; and
- a fourth high-index dielectric layer having a refractive index of between 2.1 and 2.3 and a geometrical thickness of between 10 and 40 nm.

20. The substrate as claimed in one of claims 12 to 19, characterized in that the layer(s) absorbent in the visible, positioned beneath at least one functional layer, is (are) chosen to be based on a metal or a metal alloy, such as Ti, Nb, Zr or NiCr, with a thickness of at least 1 nm.

21. The substrate as claimed in one of claims 12 to 19, characterized in that the layer(s) absorbent in the visible, positioned on top of at least one functional layer, is (are) chosen to be based on a metal or a metal alloy, such as Ti, Nb, Zr or NiCr, with a thickness of at least 1 nm.

22. The substrate as claimed in one of claims 12 to 21, characterized in that it includes what is called a cover layer or "overcoat" based on an oxide, possibly an oxide substoichiometric or superstoichiometric in oxygen, and/or nitrided, such as especially a mixed tin zinc oxide or a titanium oxide.

23. The substrate as claimed in one of claims 1 to 22, characterized in that it includes a DLC-based overcoat.

24. The substrate as claimed in claim 23, characterized in that the thickness of the overcoat is between 5 and 10 nm.

25. The substrate as claimed in one of claims 12 to 24, characterized in that the or each of the functional layers is on top of a multilayer coating whose last layer is based on zinc oxide or on a mixed oxide of zinc and another metal.

26. The substrate as claimed in one of claims 12 to 24, characterized in that the or each of the functional layers is beneath a multilayer coating whose first layer is based on zinc oxide or on a mixed oxide of zinc and another metal.

27. The substrate as claimed in either of claims 25 and 26, characterized in that the layer based on zinc oxide or on a mixed oxide of zinc and another metal is substoichiometric in oxygen.

28. The substrate as claimed in one of claims 1 to 10 and 12 to 27, characterized in that it is capable of undergoing a heat treatment, especially a bending, toughening or annealing operation.

29. The substrate as claimed in one of claims 12 to 28, characterized in that the multilayer is as follows:

$Zr:Si_3N_4/ZnO/Ti/Ag/ZnO/Zr:Si_3N_4/ZnO/Ti/Ag/ZnO/Zr:Si_3N_4$ or $Zr:Si_3N_4/ZnO/Ag/NiCr/ZnO/Zr:Si_3N_4$

optionally with thin layers of partially or completely oxidized metal placed on one of the faces of at least each of the silver layers.

30. Glazing incorporating at least one substrate as claimed in one of claims 1 to 10 and 12 to 29,

characterized in that it is in the form of laminated glazing, a symmetrical glazing or multiple glazing of the double glazing type.

31. The application of the glazing as claimed in claim 30 as interior or exterior, solar-control, low-emissivity, antireflection glazing for buildings.

32. The application of the glazing as claimed in claim 31 as automotive glazing, it being possible for this solar-protection, low-emissivity glazing to be, optionally, a heated window.

33. A plane or tubular, magnetron sputtering target for obtaining at least one layer comprising $Si_xZr_yAl_z$ on a portion of the surface of a substrate as claimed in any one of claims 1 to 10 and 12 to 29, characterized in that the Si/Zr ratio at the target is slightly different from that of the layer, with a difference of 0.1 to 0.5.